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MENTAL EVOLUTION IN MAN AND THE LOWER ANIMALS.

By ALICE BODINGTON.

The science of Psychology is at last emerging from the cloudland of Metaphysics in which it has been enveloped from immemorial ages. Deep would be the folly of the man who would declare that we know what mind or consciousness really *is*, but at least we are beginning to understand something of its phenomena on the physical side, and to recognize that even the human mind is a product of evolution. Whether an impassable gulf, or a rubicon which can be boldly and safely crossed, separates the human mind from mind in the lower animals, is still a moot point with men of the highest scientific repute.

I do not for a moment pretend to approach the question from the high metaphysical point of view, but only to apply to the subject the same method which has so successfully been applied in biology; to put theories on one side, until we have ascertained as many ordinary facts as possible. In biology the greatest triumphs have been obtained by the demonstration that ontogeny, the history of the individual, is a guide to phylogeny—the history of the race. And in examining the history of the race, we find the development of the lower species of animals an invaluable guide in understanding the development of the higher species. Moreover if we wish to understand the peculiarities of domesticated animals, we must study the habits of their wild relations. These three guides we may take in studying the development of the human mind; in the child we may study its ontogeny; in the development of intelligence in animals we can observe the dawn of faculties which attain their supreme expression in man; and in the more primitive or savage races of man, we may see the germ which contained the nucleus of our civilization.

In the child, we find at the beginning of life a mental condition as low as that of a blind puppy or a kitten, showing two instincts only,[1] of which one has but lately been revealed; and no glimmerings, for many months, of reason. From this humble beginning, to the highest point which human faculties can reach, there is no break; no point at which we can say "here mind exists, where yesterday it was not." Not only is the growth of the human mind gradual, but during its earlier phases of development it assuredly ascends "through a scale "of mental faculties parallel with those permanently presented "by the lower animals, whilst with regard to the emotions the "area these cover in the lower animals is nearly co-extensive "with that covered by the emotional faculties of man.[2]" The purely human *emotions* may indeed be limited to religion and the sense of the sublime.

And if from the history of the individual, we turn to all we know of the history of the race, the evidence of a gradual evolution of mental faculties is the same; from the rough flint weapons of the drift period, to the era of polished stone; from polished stone to bronze; from bronze to iron; from the fetich of shapeless wood stuck with feathers, and the merciless nature-gods, which men saw in sunshine and storm, in famine and in pestilence, to the Brahma of the Vedas and the God of Isaiah; from the rude sticks covered by skins of animals, and shelters of rough piled stones, to houses of wood and hewn stone, and thence to such conceptions as are embodied in the Parthenon, or in the Cathedrals of the middle ages we have similar evidences of evolution. And whatever point of view we take we see progress starting from the humblest beginnings; no matter how towering the building, its foundations are laid deep in the earth.

It has been alleged that this very progress in human affairs draws a shape line of demarcation between men and animals; that whereas in man a constant improvement goes on, no sign of progress can be found in brutes. This argument is weak on both sides. On the one hand though constant, and even rapid improvement, is a characteristic of certain races of men, yet there are numerous races whose improvement is either stationary or incredibly slow. They are to other men, what the Lingula, which has remained unchanged since Cambrian times is to other invertebrates. There are savages still in the age of unpolished stone; savages whose religion is the lowest fetich worship; savages whose only refuge is a skin spread over a few sticks, and others to whom any kind of shelter is unknown. Some progress they have all made from the furry arboreal animal with pointed ears, but it has been a progress immeasurably behind that of the higher races of man. "Rapid and continuous improvement," in the words of Mr. Romanes, "is a characteristic of only a small division of "the human race, during the last few hours, as it were, of its existence." The wonder is that with articulate language, man should have improved so slowly.

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[1] The instinct, pointing surely to an arboreal ancestry, by which a new born infant will cling to a support unaided.

[2] Romanes: Mental Evolution of Man.

On the other hand it would be impossible to deny the great improvement which has taken place in the mental and moral qualities of the dog, when we compare him with the wolves and jackals from which he is descended. He has won for himself a tribute of praise from some of our noblest poets; a tribute richly due to his devoted love and fidelity. Hear Wordsworth's lament:

> "Tears were shed.
> Both man and woman wept when thou wert dead;
> Not only for a thousand thoughts that were
> Old household words in which thou hadst thy share,
> But for some precious boons vouchsafed to thee,
> Found scarcely anywhere in like degree.
> For love that comes to all, the holy sense,
> Best gift of God, in thee was most intense;
> A chain of heart, a feeling of the mind,
> A tender sympathy which did thee bind,
> Not only to us men but to thy kind:
> Yea for thy fellow brutes in thee we saw,
> The soul of love."

And Byron writes not less warmly:

> "The poor dog, in life the firmest friend;
> The first to welcome, foremost to defend,

Whose honest heart is still his master's own,
Who labors, fights, lives, breathes for him alone,
Unhonored falls, unnoticed all his worth,
Denied in heaven *the soul he held on earth.*"

There can be little doubt that if other animals had been valued for their moral qualities, had these been carefully developed from generation to generation, they would have shown a like, or a greater improvement. The intellectual qualities shown by trained elephants, which in their youth have roamed wild through the forests, is so marvellous, that it is difficult to imagine or estimate what intelligence of the race might become after a few generations of cultivation. And the same remark applies to the acuteness of intellect shown in captivity by many apes and monkeys, which have been brought fresh from their native woods. What progress would creatures so intelligent, so teachable, so insatiably curious and so persevering make after a few generations of culture?

But putting aside the great development in the psychology of the dog, we have in paleontology the most unanswerable evidence of the vast improvement which has taken place in the *brains* of mammals since Eocene times.

In our own day the brains of the higher mammals show a great increase in the cerebrum, the part of the brain concerned especially with intellectual functions and its surface is greatly increased by convolutions. Gradually as we go back in geological time the cerebral hemispheres are smaller, then they no longer cover the mid-brain, and the latter shows distinctly, as in reptiles and fishes there are of course no convolutions, and finally in the Eocene we meet with mammals, immense in size, but with the brains of reptiles.[1]

A faulty nomenclature has probably had a great deal to answer for in the tardy recognition of the intellectual powers of the lower animals. Ideas have been divided into "simple" and "general," or into "concrete" and "abstract." It was impossible to deny the existence of simple ideas in brutes, but it was, and is, contended that they are incapable of abstract ideas. Mr. Romanes points out the existence of a wide territory between simple and abstract ideas, and he proposes a threefold definition of ideas to which he gives several names. It will make the question clearer if we take three of these names and speak of simple, complex and abstract ideas; or of percepts, recepts and concepts.

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[1] Origin of the Fittest. Cope.

This definition can be illustrated by taking the word "star." The recognition of one particular star is a simple idea or precept; the recognition of a number of stars, or of bright twinkling objects resembling the shining of stars, is a complex idea or recept. So far the mind of the higher brutes keeps pace with the developing mind of man. But the next step carries us beyond the mental powers both of infants and of animals: neither can conceive the idea of a star as present to the mind of an astronomer. This is an abstract idea or concept, and is unattainable except through the medium of articulate language. Where the child sees a twinkling spark, the astronomer is conscious of a flaming sun; where, until lately, men recognized the symbol of unchangeableness, the astronomer knows he beholds stupendous worlds rushing through space at unimaginable speed; where the Hebrew seer beheld "lesser lights" stuck in a solid firmament solely for the service of man, the astronomer knows that his eye beholds objects at a distance of millions upon millions of miles, objects whose grandeur throws our whole solar system into insignificance. An abstract idea is in itself capable of containing a volume of knowledge; its capacities have hardly any limits but that of the mind itself. Think only of the world of concepts contained in the words "political economy," "vertebrata," "liberty," "Aryan Race," "mythology," "ethics," and we see how far civilized man has outstripped, not only the lower animals, but the young of his own race and the savage; but *the break is not at the minds of the lower animals.* Rather there is no break, but a gradual evolution.

We may take as another instance of simple, complex and abstract ideas the idea of one particular dog in the mind of the child; the idea of dogs in general, extended to figures or pictures of dogs; and the ideas of the genus "Canis" as present to the mind of the zoologist. The first and second conceptions are common to the young child and the lower animals; the third transcends the power of either. The extension of simple ideas was amazingly illustrated by a little French child, who was warned not to touch fire and candles by the words "Ça brule." This idea she spontaneously applied to other shining objects. Her mother and nurse also amused her by hiding and saying "Coucou." Watching the sun set one evening the child generalized the ideas of shining, burning and of hiding, by exclaiming "Ça brule coucou." A terrier has a very simple idea as to a rabbit; to catch it and kill it anyhow and anywhere. But he also has a general idea of rabbits, as may be demonstrated by calling his attention to this idea if he is out for a walk, when a violent scampering, barking and digging for imaginary rabbits may be expected to take place. A dog formerly in the possession of the Archbishop of Canterbury had the habit of hunting pigs, and for inscrutable reason, always after prayers. After a time there were no more pigs to be hunted in the flesh, but at the word "pigs," the dog vehemently hunted imaginary pigs.

Finally it was enough to open the door, without uttering a word, and the dog rushed to his visionary pig hunt. A dog belonging to Mr. Romanes' sister showed that it not only had an idea of men and women, but that it could recognize that which was like a human being and yet was *not* one. This dog showed the utmost terror at the appearance of three life-sized pictures. But instead of attacking them with tail erect, as he would have attacked a strange person, he "barked violently and incessantly at some distance from the paintings, with tail down and body elongated, sometimes bolting under the chairs and sofas in the extremity of his fear, and continued barking from there." When the faces of the pictures were covered he became quiet and contented, but resumed his frightened barking if one was uncovered. Gradually he became accustomed to the pictures, and after a time he was taken away from the house for some months. On returning, he was again much startled at seeing the pictures, and rushed at them barking. Very quickly though he appears to have reasoned that he had seen these strange things—that were and were not—men and women, before, and that they had proved harmless, for "after three or four barks he ran back to me "with the same apologetic manner he has when he has barked "at a well-known friend by mistake."[1]

If we arbitrarily confine the definition of "reason" to the power of putting our ideas into *words*, then of course animals must be denied the faculty of reason as they do not possess that of articulate speech. But if to "reason" be to form ideas in the mind; to class them together; to be influenced by them; to act upon them, then animals possess reason. And the extent of reasoning faculty depends upon the development of the brain; on its comparative richness in convolutions, and on its cultivation by education in animals as well as in men. The difference in degree is enormous, but differences in degree do not destroy homologies in zoological classification. An elephant's nose is still a nose though it is prodigiously elongated, and serves as a tactile and prehensile organ. It is not that man has one particular organ highly specialized; immense numbers of animals have organs highly specialized; the foot of the horse; the fore limbs of the bat; the whole skeleton of the whale are conspicuous instances. In man the specialization has been in the brain, and this has made him the master of creation, but the difference between the brain of man and of apes is not so great as the difference between the foot of the horse and that of the elephant. Yet the difference being not between foot and foot, but in the very organ of thought itself, the effect is incalculable in producing superiority of the one animal over the other.

It has been asserted that we can form no general ideas without words. It is true that we so commonly put our ideas into words, that we may be tempted to identify the one with the other. But deaf mutes who have been educated have related their mental experiences when untrained, and they describe themselves as "thinking in pictures." I have had a similar experience in meeting with two plants in the forest of British Columbia; one attaining almost to the dimensions of a forest tree; the other no larger than our wood anemone, yet agreeing exactly in the botanical peculiarity of their flowers. I know now that these plants belong to the genus Cornus, but I did not ascertain this fact for many months, and in the mean time I thought of these plants *in pictures* in which I was vividly conscious of their peculiarities. And where the mind is unable to avail itself of articulate language, this faculty of thinking in pictures may be carried to a point far beyond what we may imagine credible; just as the tying of knots in strings in a particular fashion served as whole books of history to the Peruvian Indians who were unacquainted with writing.

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[1] Romanes, Animal Intelligence, p. 456.

Moreover though unable themselves to employ articulate language, the higher animals have the mental advantage of being able to understand and remember spoken words.

It is estimated that the more intelligent elephants in government employ in India and Ceylon understand more than eighty words and phrases addressed to them by their keepers. This statement is the more credible when we consider the diversity of occupations in which trained elephants are engaged. The most striking instance I know of bearing on the reasoning powers of these sagacious animals is given in Mr. Romanes' work on Animal Intelligence,[1] on the authority of Mr. Bingley.

"In the last war in India a young elephant received a violent wound in its head, the pain of which rendered it so frantic and ungovernable that it was found impossible to persuade the animal to have the part dressed. Whenever any one approached, it ran off with fury, and would suffer no person to come within several yards of it. The man who had care of it at length hit upon a contrivance for securing it. *By a few words and signs* he gave the mother of the animal sufficient intelligence of what was wanted; the sensible creature immediately seized her young one with her trunk, and held it firmly down, though groaning with agony, while the surgeon completely dressed the wound; and she continued to perform this service until the animal was perfectly recovered." When we consider the passionate devotion of the female elephant to her young one, and the fury with which she will defend it from injury or danger, it is almost impossible to admire too highly, the reasoning powers, the self-control, and the intelligent comprehension of words by this mother, under circumstances which would severely try all these qualities in a human parent. It is well-known that elephants patiently, and even gratefully endure painful operations performed on their own persons, such as the cutting open and dressing of deep ulcers, and the dropping of nitric acid in the eye. Yet the same animal would deeply resent the slightest intentional injury, such as the prick of a pin, and would lose no opportunity of revenge.

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[1] Animal Intelligence. International Scientific Series, p. 399.

The account of the extraordinary intelligence shown by the trained elephant "Siribeddi" in the capture of wild elephants, is too long to be given here but will richly repay perusal. [Animal Intelligence, p. 402]. Her comprehension of everything required of her; her original ideas of what should be done on the spur of the moment; her intense enjoyment of the sport; her Delilah-like duplicity towards her male captives; her extreme care to avoid injuring the prisoners; all show an intelligence not below that of a human hunter, whilst in her care to avoid injuring her captives, she puts the human hunter to shame.

In the parrot, low as it is in the psychological scale, compared to the higher mammals, we have examples of the comprehension of words uttered by the animal itself. Mr. Darwin gives an instance of a parrot belonging to the father of Admiral Sir J. Sullivan, which invariably called certain persons of the household, as well as visitors, by their names. He said "good morning" to everyone at breakfast, and "good night" to each as they left the room at night, and never reversed their salutations. To his master he used to add to the "good morning" a short sentence, never repeated after his master's death. He scolded a parrot which had got out of its cage and was eating apples on the kitchen table, calling it "you naughty Polly." Similar instances of the proper application of spoken words could be indefinitely multiplied, but I will only quote the account given by Dr. Samuel Wilkes

F. R. S. of his own parrot, which he carefully observed.[1] He says that when alone this bird used to " utter a long catalogue of its sayings, more especially if it heard talking in the distance, as if wishing to join in the conversation, but at other times a particular word or phrase is only spoken when suggested by a person or object. Thus, certain friends who have addressed this bird frequently by some peculiar expression, or the whistling of an air, will always be welcomed by the same words or tune, and as regards myself, when I enter the house—for my foot-step is recognized—the bird will repeat one of my sayings. My coachman coming for orders has so often been told 'half-past two,' that no sooner does he come to the door than Poll exclaims 'half past two!' Having found her awake at night I have said 'go to sleep' and now if I approach the cage after dark the same words are repeated. Then as regards objects, *if certain words have been spoken in connection with them, these are ever after associated together.* for example, at dinner time the parrot, having been accustomed to have savory morsels given to her, I taught her to say 'give me a bit.' This she now constantly repeats, but only and appropriately at dinner time. The bird associates the expression with something to eat. Again being very fond of cheese, she easily picked up the word, and always asks for cheese at the end of the dinner course, and at no other time. She is also fond of nuts, and when these are on the table she utters a peculiar squeak: this she has not been taught, but it is Poll's own name for nuts for the sound is never heard until the fruit is in sight. Some noises which she utters have been obtained from the objects themselves, as that of a corkscrew at the sight of a bottle of wine, or the noise of water poured into a tumbler, on seeing a bottle of water. The passage of the servant down the hall to open the hall door, suggests a noise of moving hinges, followed by a loud whistle for a cab."

No animal hitherto under observation in England, has shown a more remarkable comprehension of spoken words than the Chimpanzee lately in the Zoological Gardens,

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[1] Romanes, Mental Evolution in Man, p. 131.

London. This ape learned from her keeper so many words and phrases, that in this respect she resembled a child shortly before it begins to speak. Moreover it was not only particular words and phrases which she thus learnt to understand, but, to a large extent, "she understands the combination of these words and phrases into sentences, so that the keeper is able to explain to the animal what it is he expects her to do. For example she will push a straw through any particular mesh in the net-work of her cage which he indicates by such phrases as 'the one nearest your foot: now the one next the key-hole; now the one above the bar,' etc., etc. Of course there is no pointing to the places thus verbally designated, nor is any order observed in the designation. The animal understands what is meant by the words alone, and this even when a particular mesh is named by the keeper remarking to her the accident of its having a piece of straw already attached to it." This Chimpanzee could also count correctly as far as five. She was asked for two straws, five straws, one straw, etc., no order being observed in the requests. If she were asked for four straws she successively picked up three straws and put them in her mouth, then she picked up the fourth and handed over all the four together; the ape having been taught, if more than one straw were asked for, to hold the others in her mouth until the sum was completed.

The Crow is little behind the Chimpanzee in arithmetical genius if Monsieur Leroy Ranger at Versailles is to be trusted, and as his life-work consisted in watching the wild and tame animals of the royal domain, he was hardly likely to be deceived. He says "crows will not return to their nests durday-light, if they see anyone waiting to shoot them. If to lull suspicion a hut is made below the rookery, and a man conceals himself in it with a gun, he waits in vain if the bird has ever before been shot at in a similar manner. She knows that fire will issue from the cave into which she saw the man enter. To deceive these suspicious birds, the plan was hit upon of sending two men into the watch-house, one of whom passed on, whilst the other remained. But the crow counted and kept her distance. The next day three went, and again she perceived that only two returned. In fine it was found necessary to send five or six men to the watch-house, in order to put her out of her calculations." The ape and the crow here contrast advantageously with savages who can only count up to one and two, and with the Dammaras who apparently can count only one. In buying sheep from a Dammara one must pay for each sheep separately, for if a stick of tobacco is the price agreed on for a sheep, it would sorely puzzle the simple savage to take two sheep and give him two sticks.[1] One stick must be paid for each sheep separately.

Of the intelligence of the special friend of man in the understanding of spoken words innumerable instances could be given, and many will, no doubt, recur to the mind of any person who has ever owned or watched a dog. Hogg the "Ettrick Shepherd" had a collie who understood most things his master said to him. On one occasion Hogg observed in the most natural tone possible. "I'm thinking the cow's in the potatoes." Immediately the dog, which had been lying half asleep on the floor, jumped up, ran into the potato field, round the house, and up the roof to take a survey; but finding no cow in the potatoes, lay down again. Some little time afterwards his master said in a tone of conviction: "I'm sure the cow's in the potatoes," when the same scene was repeated. But on trying it a third time, the dog only wagged its tail. I had a rough terrier named "Butts" which had, like most dogs, a horror of a bath. If the fatal words "Butts must be washed," or "Butts must have a bath" were uttered in his presence, he would like the "Snark" slowly and silently vanish away, and would be found—if found at all—cowering under the remotest of beds, trembling with apprehension.[2]

From the comprehension of spoken words, (with their imitative use by parrots) we come to the question of the *origin* of language. Did it spring from the human mind, ready equipped for all uses, like Minerva from the brain of Jove? Or was its origin as simple and as humble, as evolution has shown the early beginnings of other things to be?

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[1] Galton. Tropical South Africa.

[2] I have lately had the privilege of making the acquaintance of a dog called "Peter," who undoubtedly understands spoken words, and not only special tones. Certain words uttered by complete strangers to Peter result in his performance of certain actions, such as " dying for his Queen, fetching slippers, shutting the door, walking and jumping through a hoop, etc., etc. The dog's whole face is quivering with intelligent excitement when he is spoken to.

In studying the evidence for mental evolution supplied by language, it is essential to begin with the most primitive forms known to us. Instead therefore of having recourse to Sanskrit and kindred Aryan languages, the product of the mental processes of the highest race of man, we must examine the forms of speech of primitive people, and of semi-civilized and savage tribes. Here again ontogeny may take us further and deeper than phylogeny, and problems which have puzzled the learned may find their solution in the nursery.

The dawning wishes and desires of an infant are expressed by indeterminate movements of the legs and arms. A vigorous kicking of the legs will express the joy of a healthy baby at being taken from a place of which it is tired to a fresh room, or out-of-doors. Perhaps the first determinate movement that can be noticed is the forward movement of the arms with the hope of being taken by father, mother, or nurse, and the next, the stretching out of the hands for some coveted object, both occurring very early in a healthy baby. The frustration of these desires, as most of us know to our cost, is accompanied by most piercing vocal demonstrations indicating pain, anger, or disappointment. I cannot help regarding these vocal demonstrations as survivals from the mode of expressing himself "*Homo alalus.*" And if Miocene man roared and screamed as lustily in proportion to *his* size, as does our modern baby, the din must have been truly appalling, and calculated to strike terror into the heart of the Mastodon himself.

(*To be continued.*)